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EXAMINER	
AHMED, SHEEBA	
ART UNIT	PAPER NUMBER
1773	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/038,334	Applicant(s) DANI ET AL.	
	Examiner Sheeba Ahmed	Art Unit 1773	

-- The MAILING DATE of this communication appears n the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1-11, 13, 14, and 28-30 are rejected under 35 U.S.C. 102(a) as being anticipated by Misra et al. (EP 1143511 A2 and EP 1143512 A2).

Misra et al. disclose a thermally conductive compound ***(corresponding to the thermal interface material of the claimed invention)*** for improving heat transfer from a heat-generating device such as a semiconductor device ***(corresponds to the electronic component of claim 28)*** to a heat dissipater such as a heat sink ***(corresponds to the thermally conductive member of claim 28)*** wherein the compound comprises coated particles blended with a polymeric carrier ***(corresponding to the polymer matrix material of the claimed invention)*** wherein the polymeric carrier may be silicone oil ***(thus meeting the limitations of claims 4 and 5)***. The particles may be alumina, aluminum nitride or boron nitride, which are coated with a low melting alloy of indium and/or gallium ***(corresponding to the filler and solder particles of the claimed invention and meeting the limitations of claims 14 and 30)***. The particle size is such that the average cross-sectional thickness is less than 5 microns ***(thus meeting the limitations of claim 13)*** (Page 2, lines 10-15, 45-55, and Page 3, line 7 in EP 1143511 A2 and Page 2, lines 5-10 and 33-54 in EP 1143512 A2).

Example II, in both EP 1143511 A2 and EP 1143512 A2, shows that the melting point of the alloy containing indium, tin, and bismuth ***(corresponding to the InSnBi solder particles recited in claim 9)*** is 60°C ***(thus meeting the limitations of claim 11 and the melting point of alumina is 1800°C and hence the limitations of claims 28 and 29 are also met)*** and that formulations I and II described in Table II contain 5.71 and 8.19 weight % ***(thus meeting the limitations of claims 2, 3, and 6-8)*** of the matrix component (i.e., silicone oil and the silane), respectively. Figure 1 illustrates the manner in which improved contact is obtained between the individual coated particles ***(i.e., the particles are fused together and hence the limitations of claim 28 are met)*** and the surface characteristics and properties are improved by the formation of bridges (page 6, lines 35-39 and Figure 1). With regards to claim 10, the Examiner takes the position that the solder particles disclosed by Misra et al. must inherently not attack the silicone matrix material given that the chemical composition of the solder particles taught by Misra et al. and that of the claimed invention are identical. All limitations of claims 1-11, 13, and 28-30 are disclosed in the above reference.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, 5, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by De Sorgo (EP 0790762 A2).

De Sorgo discloses a thermally conductive interface material that may be employed between an electrical component and a heat sink and comprises one or more thermally conductive particulate fillers dispersed in a polymer binder ***(corresponding to the polymer matrix material of the claimed invention)***. Typical binders include silicones, thermoplastic rubbers, urethanes and other elastomers ***(thus meeting the limitations of claims 4 and 5)*** and typical fillers include aluminum oxide, magnesium oxide, boron nitride and aluminum nitride ***(corresponding to the fusible solder particles of the claimed invention given that a solder is simply defined as a metal or metallic alloy used to join materials)*** provided in particle sizes ranging from 1 to 50 microns ***(thus meeting the limitations of claim 13)*** (Page 2, lines 27-38). Other fillers and additives may be included to the extent that the thermal conductivity and other physical properties are not compromised (Page 5, lines 18-20). All limitations of claims 1, 4, 5, and 13 are disclosed in the above reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cross et al. (US 6,284,817 B1) in view of Igaki et al. (WO00/13190).

Cross et al. disclose conductive, resin-based compositions used as thermal or heat dissipation interface materials. Resins employed in such compositions include silicone, epoxy, vinyl and acrylic materials and silicone resins are particularly desirable because of their high elasticity for stress relief, low moisture uptake, ionic purity, wide-temperature performance, and excellent electrical properties such as electrical insulating properties (Column 1, lines 10-13, 34-43, Column 2, lines 3-8, 64-68 and Column 3, lines 1-5). The conductive, resin-based compositions include a first conductive filler component and a second conductive filler component (Column 4, lines 36-40). The first and second conductive filler components may be iron, aluminum, zinc, silver, gold, lead, nickel, magnesium, barium, silicon and conductive derivatives of theses (Column 6, lines 37-45). The particle size of the first conductive filler is in the range of from about 10 to about 15 microns and the particle size of the second conductive filler is in the range of 1 to 10 microns (Column 9, lines 25-31). The conductive fillers are present in the resin material in an amount from about 25% to about 95% by weight of the total weight of the composition. For example, the conductive resin composition may comprise the first conductive filler in an amount of from 50 to about 75% by weight of the resin-based conductive composition and the second conductive filler at a concentration of from about 5 to 50% by weight of the resin-based conductive composition (Column 10, lines 18-29).

Cross et al. do not teach that one of the two conductive particles in their resinous conductive composition are solder particles.

However, Igaki et al., in WO00/13190, disclose a conductive paste, which has low resistance and can tolerate stress so as to enable the formation of a conductive structure and comprises conductive particles dispersed in a viscous resin or cure type resin. The conductive particles may be metallic particles such as gold, silver, copper, tin, indium, palladium, nickel or lead particles. Indium particles are preferred because they allow the contact area to be extended when compressive force is applied to the conductive paste and because mutual interfaces of such indium solder particles are fused together upon heating to lower resistance and allow better conduction.

Accordingly, it would have been obvious to replace one of the two conductive particles in the resinous conductive composition taught by Cross et al. given that Igaki et al., in WO00/13190, specifically teach that indium particles are preferred in a conductive composition because they allow the contact area to be extended when compressive force is applied to the conductive paste and because mutual interfaces of such indium solder particles are fused together upon heating to lower resistance and allow better conduction. Furthermore, with regards to claims 2, 3, 6-8, and 15-19, the Examiner would like to point out that Cross et al. specifically teach that the conductive fillers are present in the resin material in an amount from about 25% to about 95% by weight of the total weight of the composition (i.e., the amount of the resin varies from 5 to 75% by weight of the total weight of the resin) and hence it would have been obvious to one having ordinary skill in the art to select any amount combination of resin and conductive particles given that Cross et al. teach all combinations within the disclosed range as equivalents. Furthermore, the Examiners would like to point out that the

melting point of pure indium particles and aluminum particles is 156.61°C and 660.37°C, respectively and hence when one selects aluminum and indium particles as the two conductive particles in the composition taught by Cross et al, then all melting point limitations of claim 11, 12, and 22-25 are met.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,479,763 B1 is related to WO00/13190.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheeba Ahmed whose telephone number is (703)305-0594. The examiner can normally be reached on Mondays and Thursdays from 8am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703)308-2367. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Sheeba Ahmed
Art Unit 1773
August 14, 2003